



Approved by: /s/Kent P. Connaughton 11/5/10
Kent P. Connaughton, Regional Forester Date

A Message from the Regional Forester

We have seen White-nose Syndrome move rapidly across the Eastern Region in the last four years, and it most likely will continue to spread. To date, bat hibernacula on the Green Mountain and Monongahela National Forests have been affected by this disease. Threatened, endangered and sensitive species are at risk. Over a million bats have died.

I have certain expectations as this response plan is implemented:

- Treat White-nose Syndrome as seriously as the risk it is to bat populations. This issue demands a sense of urgency.
- All White-nose Syndrome response activities will be carried out safely. Numerous safety measures are identified in this plan, both for handling bats and for monitoring bat habitat. Supplement existing Job Hazard Analyses with these measures, where applicable.
- Promote and support bat conservation activities at the state, regional and national levels. We are part of a family of agencies trying to combat this disease and conserve these essential animals. Be a leader – get involved where you can, including active participation in the development of state-level White-nose Syndrome action plans.
- Update this response plan as needed. Information about White-nose Syndrome can come in fast and furious – keep up with it.
- Engage partners and volunteers in bat conservation and White-nose Syndrome response activities and programs on your unit. Reach out to grottos and recreational cavers and invite them to assist you in implementing this response plan.

Kent P. Connaughton
Regional Forester, Eastern Region
November 2010

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A. Background Information

Purpose

White-nose Syndrome (WNS) is a wildlife health crisis affecting bats. The purpose of this response plan is to describe how the Eastern Region (Region 9) will enact measures to prevent and/or slow the spread of the disease and its causative agent, *Geomyces destructans*, while contributing to the international effort to better understand and manage WNS.

This plan tiers to the **National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats** (*National WNS Response Plan*) (available at: <http://www.fws.gov/WhiteNoseSyndrome/planning.html>) and to the **Forest Service Interim WNS Strategy** included in the Chief's 28 July 2010 letter (see Correspondence Database for a copy of the letter and strategy). The *National WNS Response Plan* establishes a strategic framework for addressing the critical aspects of WNS management, from disease management to conservation and recovery of WNS-affected bat populations. A companion *WNS Implementation Plan* is being developed by a contingent of experts and will provide detailed guidance and direction on such things as disease surveillance, population monitoring, captive rearing, and disease diagnostics. The *WNS Implementation Plan* will be dynamic; information and research needs identified over time will be folded into the *WNS Implementation Plan* through review processes to be established by the newly formed multi-agency WNS Organization.

This Eastern Region WNS Response Plan sets the stage for how Region 9 employees and units can contribute to the WNS body of knowledge and assist in slowing the spread of the disease. It lays out the pieces of the *National WNS Response Plan* strategy for which Region 9 can play a key role.

White-nose Syndrome (General Information)

White-nose Syndrome is a disease responsible for unprecedented mortality in hibernating bats in the northeastern United States. This previously unknown disease has spread very rapidly since its documentation in January 2007 by New York Department of Environmental Conservation biologists, and poses a considerable threat to hibernating bats throughout North America.

White-nose Syndrome was named for the visible presence of a white fungus around the muzzles, ears, and wing membranes of affected bats. Scientists recently identified a previously unknown species of cold-loving fungus (*G. destructans*) as a consistent pathogen causing skin infection in bats at affected sites. This fungus thrives in low temperatures (40-55°F) and high levels of humidity (>90 percent), conditions characteristic of caves and mines where many bats hibernate.

The fungus has been documented on bats in Europe, but mass mortalities have not been observed in European bat populations associated with *G. destructans*-affected sites. The recent discovery of the fungus and subsequent deaths of bats in North America have led scientists to question whether this is an invasive species introduced from Europe.

Pathologic findings thus far indicate that the fungal infections can be detected as early as October, and it is hypothesized that bats affected by WNS arouse from hibernation more frequently, and/or for longer periods than normal, and are prematurely expending the fat reserves they rely on for winter survival. Chronic disturbance of hibernating bats is known to cause high rates of winter mortality through accelerated fat loss. Unusual behaviors associated with WNS may cause bats to consume critical fat

reserves too quickly during winter. Unusual behaviors observed at WNS-affected sites may include shifts of large numbers of bats in a hibernaculum to roosts near the entrance or unusually cold areas within the site; large numbers of bats dispersing during the day from hibernacula, even during mid-winter; a general unresponsiveness of bats to human disturbance; and, large numbers of fatalities, either inside the hibernaculum, near the entrance, or in the immediate vicinity of the entrance.

Although scientific evidence indicates that skin infection by *G. destructans* is a plausible primary cause of mortality associated with WNS, the exact processes by which skin infection leads to death remain undetermined, and it is unclear whether other underlying conditions contribute to susceptibility to fungal infection and/or mortality.

Species known to be susceptible to WNS thus far are the **little brown bat** (*Myotis lucifugus*), **Indiana bat** (*M. sodalis*), **northern long-eared bat** (*M. septentrionalis*), **eastern small-footed bat** (*M. leibii*), **tri-colored bat** (*Perimyotis subflavus*), and **big brown bat** (*Eptesicus fuscus*). Three additional bat species were found in 2010 that tested positive for the presence of *G. destructans*, the fungus associated with WNS, but not with the infection that is characteristic of the disease. These bats, the **gray bat** (*M. grisescens*), **cave myotis** (*M. velifer*), and **southeastern myotis** (*M. austroriparius*), were found in Missouri, Oklahoma, and Virginia, respectively, and this discovery could portend the spread of WNS into new bat species and new regions of the southeastern and western United States in 2011.

The direct human health risk from WNS is unknown, but appears to be low. Because *G. destructans* only grows at cool temperatures (40-68°F), considerably lower than those of the human body, it is unlikely to cause infection in humans. No human illnesses to date have been associated with contact or exposure to WNS-infected bats or sites. Many WNS-infected bats exhibit unusual behaviors and may be found in large numbers in locations not normally inhabited by bats; contact with bats, particularly in these settings, should be avoided since bats can be potential sources for other human diseases including rabies, histoplasmosis, and ammonia toxicity. People handling bats or entering their roosts should use safe work practices and personal protective equipment to minimize exposure to infectious or toxic agents.

Additional Information

The U. S. Fish and Wildlife Service (USFWS) maintains a website with the latest information about WNS at: <http://www.fws.gov/WhiteNoseSyndrome/>. Copies of completed national, regional or state WNS response plans can be obtained at this website:

<http://www.fws.gov/WhiteNoseSyndrome/planning.html>

The National Speleological Society maintains a website that is recognized for its compilation of media stories about WNS, cave/mine closures, and the decontamination procedures:

<http://www.caves.org/WNS/>.

Bat Conservation International, Inc. provides an array of educational information about bats on its web site: <http://www.batcon.org/>.

The U. S. Geological Survey (USGS) has a web site that details why WNS is a concern to bat diversity, including endangered bats: <http://www.fort.usgs.gov/WNS/>

The USGS National Wildlife Health Center's website offers information related to the fungal pathogen tied to WNS: http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome/index.jsp

B. Communications and Outreach Plan

Internal and External Communication

Responding to WNS requires good communication within Region 9's organization and with its partners. Information such as disease surveillance results must be shared in a timely manner and with the right people.

- Lists of people involved with the WNS investigation at the national, regional, and local levels are provided in Appendix 1(a-d). These contact lists will be reviewed periodically and updated as necessary.
- When applicable, this response plan identifies the person(s) with whom specific WNS-related information should be shared.
- This response plan and any updates to it will be maintained on the FS Web.

Education and Outreach

Education and outreach is an essential element to the Region 9 WNS Response Plan – its purpose being to:

- convey to Region 9 employees and citizens how WNS is affecting bats and what effect that will have on people;
- inform employees and citizens what they can do to help slow-the-spread of WNS and where they can access the most current and accurate information about WNS and bats; and,
- engage citizens in bat conservation and the efforts to fight WNS.

Region 9's goal is to collaborate with other people, organizations, and agencies to:

- Promote positive change in people's attitudes about bats (by)
 - spreading awareness about bats and their importance to humans and to ecosystems; and
 - increasing understanding of the sensitivity of hibernacula (i.e., caves and mines) and the need for access restrictions.
- Engage citizens in bat conservation activities (by)
 - developing partnerships with local caving grottos to accomplish WNS surveillance, to locate and evaluate hibernacula, and to implement outreach activities; and
 - providing citizens the opportunity to participate in National Forest management and educational activities.

Outreach efforts will be focused towards the following audiences (in priority order):

1. Region 9 employees
2. Recreational cavers (organized groups, individuals) who visit Region 9 caves on the Hoosier, Mark Twain, Monongahela, and Shawnee National Forests
3. Forest neighbors (includes K-12 schools) and visitors

Becky Ewing (Wildlife, Endangered Species) and Jane Cliff (Public and Governmental Affairs) will co-lead a self-directed team, which will oversee the development and dissemination of educational materials to our audiences. The co-leads will be in direct communication with the Communications and Outreach Working Group that is implementing the *National WNS Response Plan*.

Charter members of Region 9's self-directed Education and Outreach Team include Ann Tusha (Regional Office), Michelle Tamez (Allegheny NF), Cynthia Sandeno (Monongahela NF), Judi Perez (Hoosier NF), Katrina Schultes (Wayne NF), Peter Youngbaer (National Speleological Society), Carol Zokaites (Virginia Department of Conservation and Recreation), and Dianne Gillespie (National Cave and Karst Research Institute).

The team will meet quarterly, or more often if needed, to identify priorities for creation of educational products and their dissemination, and to evaluate the success of outreach efforts. Meetings will occur via teleconference or videoconference.

C. Decontamination Procedures

All available evidence indicates that WNS is caused by an infectious agent, and therefore can potentially be spread by all known modes of disease transmission, including direct contact, inhalation, ingestion, on inanimate objects, and by human or animal vectors.

Wildlife diseases such as WNS spread rapidly when there is high prevalence of pathogen(s), efficient chains of transmission, abundant susceptible hosts, and/or environments that allow pathogen persistence without a host. Regardless of the nature of the infectious agent (fungus, bacterium, or virus), universal precautions should be implemented to reduce incidence of disease by both preventing infections and breaking chains of transmission.

Therefore, adherence to these general actions is considered to be prudent for combating the spread of WNS through human-assisted means:

- a. Avoid direct contact with bats, contaminated objects, and body fluids;
- b. Wear barriers (e.g., gloves, coveralls, etc.) when contact with bats is necessary or expected (single-use items are recommended);
- c. Carefully handle, clean, and disinfect potentially contaminated objects between contact with animals and/or field locations;
- d. Observe proper technique during sample collection for genetic or microbiological analyses (e.g. wing punch biopsies);
- e. Promote prevention of infection through constant personal surveillance;
- f. Maintain oversight within the research, wildlife management, and caving communities;
- g. Adhere to basic hygiene practices that are known to minimize the spread of infectious agents, including use of hot, soapy water for washing hands, clothing, and equipment; and
- h. Increase public awareness and education.

In addition to the actions listed above, all employees, volunteers, contractors, and permittees will apply approved decontamination protocols at all National Forest System abandoned mines and caves (per Chief Tidwell's July 28, 2010 letter). Decontamination protocols reduce the potential for transmission of *G. destructans* from site-to-site and from bat-to-bat (i.e., during bat handling activities).

Two sets of decontamination protocols have been established, each of which has been developed after laboratory testing of decontamination products, contacts with manufacturers of various materials and gear, and field testing by biologists and cavers. The protocols can be obtained on the USFWS's WNS Website. As new information about decontamination is identified, the protocols are updated, so it is prudent to review the protocols prior to the start of a new project, or the beginning of a new field season.

A. Cave/Mine Entry Protocol

This protocol is sometimes referred to as the "Caver's Protocol", but should be followed by anyone (including employees, contractors, volunteers, and permittees) entering a cave or abandoned mine. There is a one-page document called the "WNS Decontamination Protocol,

July 2010” and a four-page document called “Supporting Decontamination Documentation for Cavers, July 2010” available at: <http://www.fws.gov/whitenosesyndrome/cavers.html>.

B. Bat Research/Monitoring Protocol

This protocol is sometimes referred to as the “Researcher’s Protocol”. Decontamination procedures for people that handle bats are presented in a MS PowerPoint format at: <http://www.fws.gov/whitenosesyndrome/research.html>. This protocol builds upon the Caver’s Protocol by providing detailed information on decontamination of traps, nets, and other gear when conducting bat surveys.

Chief Tidwell issued a document entitled, ***Decontamination Procedures for National Forest System Lands*** on July 28, 2010 (Appendix 2). This document includes the Caver’s Protocol, but should be reviewed for Forest Service-specific direction on entrance to mines and caves, storage and disposal of decontamination products, and show caves/tourist mines.

Adherence to decontamination protocols is essential, yet the amount of information found in these protocol documents can be overwhelming. A 2010-2011 priority for the Region 9 Education and Outreach Team will be to work with biologists and cavers, and the National Communications and Outreach Working Group, to develop clear and concise decontamination fact sheets that can be used by employees and others. The Region 9 team will also lead an effort to develop a decontamination Job Hazard Analysis template for use by Region 9 employees.

D. Disease Surveillance

Ongoing surveillance studies within WNS-affected and nearby unaffected zones is important in helping to define or clarify several aspects of WNS, including the rate at which the disease is migrating, the direction in which it is moving, seasonal concerns in transmission cycles, and mechanisms of transmission of *G. destructans* infection. Surveillance will also be of value in assessing the potential efficacy of mitigation and control efforts and perhaps in predicting the magnitude and severity of future disease outbreaks in bat populations.

Surveillance activities should be done by experienced field investigators operating under the appropriate state and federal permits, if required. However, every effort should be made to enlist capable volunteers who can provide basic assistance. All individuals who may directly handle bats must have received rabies pre-exposure prophylaxis (vaccination), and must adhere to all current handling and decontamination protocols.

State wildlife agencies have the lead for identifying surveillance methods appropriate for that individual state. Prior to implementing a disease surveillance strategy, Forest/Prairie Supervisors should coordinate with state wildlife agencies to ensure surveillance methodologies employed on National Forest System lands comply with state plans and protocols.

Potential disease surveillance methods include¹:

Non-invasive Methods (External Hibernaculum Survey)

- General visits to cave/mine entrances

Invasive Methods (collection of genetic material, fur/skin swabs, carcasses, wing damage)

- Capture (see Conservation and Recovery, Section F)
- Internal Hibernaculum Survey
 - Focus internal visits at high priority sites
 - Minimize disturbances (maximize information gained from the visit, limit long surveys to a reasonable sample of hibernacula on your unit)
 - If WNS is suspected during a visit, follow the carcass collection and submission guidelines (see Disease Diagnostics, Section E).

Consider the following questions when developing a surveillance strategy for your unit:

1. Does the value of the data obtained further our understanding of WNS distribution in an area?
2. Is the site locally or regionally significant for bat conservation?
3. Is it practical to monitor the site over time?
4. Are there historic baseline data that have already been collected for the site?
5. Is the geographic location important to a regional understanding of WNS?
6. Does the site get a high level of human activity?
7. Is it logistically feasible to survey the site?
8. Are there others collecting data at or near the site?

¹ From the WNS Surveillance and Monitoring Task Group (Joseph Duchamp, Eric Britzke, Mylea Bayless, Pat Ormsbee, Anne Ballmann, and Craig Willis); based on discussions at the 2009 WNS Symposium in Pittsburgh, PA.

E. Disease Diagnostics

A. Terminology used in the White-nose Syndrome Disease Investigation

White-nose Syndrome is a disease of bats infected with the fungus *G. destructans*. The criteria for confirming a diagnosis of WNS requires histological evidence of infection with *G. destructans*. It is possible to detect the fungus by histology in a bat that does not exhibit field signs of WNS.

The following definitions have been prepared by the USGS National Wildlife Health Center to promote a common understanding of WNS-related terms.

Suspect positive bat:

Field signs suggestive of WNS in a county with no prior or unknown history of WNS; further diagnostics (PCR, culture, fungal tape and histopathology) either not done or are all negative

PCR positive means there is presence of *G. destructans* genome although the viability of the organism is unknown; No field signs reported, no histology performed or negative

Culture positive means there is viable *G. destructans* present; no field signs reported, no histology performed or negative

Fungal tape strip of bat fur or skin positive for *G. destructans* conidia; no field signs reported, no histology performed or negative

Presumptive positive bat:

Field signs suggestive of WNS and PCR positive for *G. destructans*; histopathology either not performed or negative

Field signs suggestive of WNS and culture positive for *G. destructans*; histopathology either not performed or negative

Field signs suggestive of WNS and fungal tape strip of bat skin positive for *G. destructans* conidia; histopathology either not performed or negative

Field signs suggestive of WNS and WNS have been previously laboratory confirmed in the county; no further diagnostics performed

Confirmed positive bat:

WNS confirmed positive bats are those that fulfill histologic criteria for the disease. These criteria require the identification of a specific pattern of fungal colonization in the epidermis which may extend to invasion of the dermis and connective tissue. Histology can also confirm the presence/identity of *G. destructans* if distinctive conidia are observed. Field signs, PCR, tape strip, and culture can be negative for bats that fulfill the histologic criteria for confirmed WNS. If *G. destructans* conidia are not present, follow-up PCR should be considered to confirm the identity of the organism.

Negative bat: None of the above criteria fulfilled

B. Reporting a Bat Mortality Event/Submitting a Carcass for Testing

1. Contact your state wildlife agency bat coordinator (Appendix 1d). Provide a description of your observations, which should include:
 - Date of observation
 - Location (county, cave/mine name, coordinates)
 - Number of individuals affected by species
 - General condition of carcass and environment
 - Photos

For an example of a ***Specimen History Form***, please see the USGS National Wildlife Health Center website: http://www.nwhc.usgs.gov/mortality_events/reporting.jsp).

2. The USGS National Wildlife Health Center has asked the state wildlife agencies to take the responsibility for determining whether carcass(es) from their individual state should be tested for WNS. Their determination will depend upon a number of factors. All carcasses considered for testing must be in a good condition with little decomposition.
3. A number of laboratories have been certified to test carcasses for WNS. The state wildlife agency will identify which is the preferred laboratory.
4. If sending a specimen to the **USGS National Wildlife Health Center**, please refer to the specimen submission and shipping guidelines posted at: http://www.nwhc.usgs.gov/mortality_events/reporting.jsp. This guidance on carcass preservation and shipment would apply whether you are shipping it to the National Wildlife Health Center or another laboratory. Contact the appropriate field team representative prior to shipping a carcass:

The National Wildlife Health Center Field Investigative Team representative for the **Eastern** United States is **Dr. Anne Ballman**, 608-270-2445, aballmann@usgs.gov. The Allegheny, Finger Lakes, Green Mountain, Monongahela, Wayne, and White Mountain National Forests are within her area.

The National Wildlife Health Center Field Investigative Team representative for the **Central** United States is **Dr. LeAnn White**, 608-270-2491, clwhite@usgs.gov. The Chequamegon-Nicolet, Chippewa, Hiawatha, Hoosier, Huron-Manistee, Mark Twain, Midewin NTGP, Ottawa, Shawnee, and Superior National Forests are within her area.

5. Notify Becky Ewing, Regional Wildlife Biologist, with a summary of any mortality observation and if any specimens are shipped for testing.

F. Conservation and Recovery

A. Hibernaculum Protection Needs

Through Federal laws and regulations, the Forest Service has major responsibility for conserving biodiversity through the management of fish and wildlife habitats, including caves, and by providing special protection for threatened, endangered, and sensitive species. The Federal Cave Resource Protection Act of 1988 directs the Forest Service to secure, protect, and preserve significant caves on Federal lands and to foster increased cooperation and exchange of information between governmental authorities and those who use caves for scientific, education, or recreational purposes.

Nine national forests in the Eastern Region possess abandoned mines or caves with winter bat habitat (hibernacula). Access to these sites has been closed to slow-the-spread of WNS, either through Forest-level closure orders or by structural improvements such as bat-friendly gates.

Forest	Closure Order Signed	Closure Order Expires	Hibernacula Description
Allegheny (PA)	01 June 2010	In effect until terminated earlier by Forest Supervisor	One cave
Green Mountain (VT)	N/A	N/A	One gated mine
Hoosier (IN)	03 May 2010	03 May 2013	Caves
Huron-Manistee (MI)	N/A	N/A	One hydroelectric dam
Mark Twain (MO)	24 April 2010	24 April 2011	Caves and mines
Monongahela (WV)	15 April 2010	30 June 2012	Caves and mines
Ottawa (MI)	19 May 2010	19 May 2011	Copper mines
Shawnee (IL)	19 April 2010	19 April 2013	Caves and mines
Wayne (OH)	19 May 2010	19 May 2015	Coal and limestone mines

While WNS is transmitted through bat-to-bat interaction inside caves and mines, there is also strong evidence that suggests the fungus, *G. destructans*, can be transported inadvertently from site-to-site on footwear, clothing, and gear of visitors to hibernacula. One way fungi reproduce is through the production of spores. These reproductive structures are small and not easily seen by the naked eye. They are lightweight and can become airborne when released. A visitor to an infected hibernaculum could stir up spores and never know they were carrying the spores to another site. Spores are designed specifically to withstand conditions otherwise unsuitable to the fungus (hot and dry) and to flourish once returned to suitable growing conditions in another hibernaculum.

A secondary reason for limiting access to hibernacula on National Forest System lands is to limit disturbance to hibernating bats. Bats go into hibernation in the fall with only enough fat to sustain them until spring emergence. Each time a bat is aroused during hibernation, it burns a certain amount of its fat reserves. Visitors to hibernacula inadvertently cause noise and

increased air temperatures, which leads to bat arousal. In these cases, arousal often occurs long after the people have moved through, so they do not see the full impact to the bats. The Forest Service needs to ensure the bats roosting in National Forest System hibernacula are in peak physiological form and have the best possible chance of survival in the event WNS is introduced into their hibernaculum.

1. Closure Orders

Forest Supervisor closure orders for the Mark Twain and Ottawa National Forests will expire in 2011. Forest Supervisors for these units will review and evaluate the latest science regarding transmission of WNS when determining the need to extend or modify the closure orders as a means to slow-the-spread of WNS.

2. Bat-friendly Gates

Forest Supervisors will identify bat-friendly gate needs for permanent closure of sites, including any existing gates that are deficient in their design. Priority for gates will be given to sites where there is a public safety concern or where threatened, endangered, or sensitive species are present. Opportunities to improve cave/mine habitat and karst features should be weighed against the risk of transmitting WNS into the site.

3. Cave and Abandoned Mine Inventory

Forest Supervisors should continue to support efforts to evaluate and prioritize caves and abandoned mines for value as bat habitat to the extent safety regulations allow.

B. Population Inventory and Monitoring

There are conservation and regulatory reasons for collecting bat population data, however any such effort must minimize disturbance to hibernating bats and must try to eliminate possible human-induced bat-to-bat or species-to-species transmission of WNS. Decontamination protocols for survey gear must be followed closely ("Researcher Protocol").

Scientists believe fall swarming is a key period for the transmission of WNS among bats. Bats may visit many caves or mines during this period and if *G. destructans* is present at a swarming site, it could be transmitted through bat-to-bat contact and spread to many more sites. While not observed to date, there is potential for some tree bats to become infected by WNS at this time because they may swarm with cave bats on occasion. Spring emergence is also a time when bats may harbor viable *G. destructans* spores (conidia). Because of these WNS transmission concerns, the community of scientists involved in WNS are discouraging fall swarming and spring sampling unless necessary for the most important and focused WNS research projects.

State wildlife agencies have the lead for monitoring animal populations and therefore, Forest/Prairie Supervisors should coordinate with state wildlife agencies to ensure monitoring methodologies employed on National Forest System lands comply with state plans and protocols. However, the following points should be considered if a population monitoring project is implemented on National Forest System lands.

Summer Capture (Mist Netting)

- Utilize mist netting to acquire bat population information only when deemed necessary or appropriate by the state wildlife agency or USFWS; for example, in certain instances, mist netting could help further the knowledge of a species or of WNS

- Delay the start of netting until June 1st to limit exposure to viable conidia of *G. destructans*

Spring and Fall Capture (at Hibernaculum Entrance)

- Avoid the use of harp traps or mist nets, unless deemed necessary or appropriate by the state wildlife agency or USFWS
- Use alternate techniques such as emergence counts or acoustic surveys, when possible

Winter Surveys (Internal Hibernaculum Survey)

- Focus internal visits at high priority sites
- Minimize disturbances (maximize information gained from the visit, limit long surveys to a reasonable sample of hibernacula on your unit)
- If WNS is suspected during a visit, follow the carcass collection and submission guidelines (see Disease Diagnostics, Section E).

Acoustic Surveys

Echolocation recording equipment can be used for both mobile and stationary surveys. Each Region 9 unit has acquired one or more echolocation recording devices with Forest Service WNS Special Emphasis funding. Forest/Prairie Supervisors will:

- Continue to implement the acoustic transect surveys established in 2009 and 2010, based on the publication by Eric Britzke and Carl Herzog (*Using Acoustic Surveys to Monitor Population Trends in Bats*). Data collected are being compiled to evaluate summer bat population trends before and after the spread of WNS, both on a local and regional level.
- Encourage biologists and partners to utilize the echolocation recording devices for other bat population monitoring opportunities in and around the Forests/Prairie.

C. Species Conservation

Region 9 is completing an update to the Regional Forester Sensitive Species list in FY'11. Forest/Prairie Supervisors will review and evaluate existing habitat and population data to determine if any WNS-affected bat species meet the criteria for Regional Forester Sensitive Species status.

Land and Resource Management Plans for the Eastern Region National Forests include goals and objectives for protecting and restoring forest and prairie ecosystems. Management activities prescribed in these Plans are the key to providing and maintaining the aquatic, riparian and upland habitat needed by bat species. Forest/Prairie Supervisors will continue efforts to achieve habitat improvement and restoration goals outlined in the Land and Resource Management Plans.

G. Data Management

Population Monitoring Data

Data associated with bat population monitoring will be entered into NRIS Wildlife.

NRIS Wildlife training is being offered as online courses (see the NRIS Wildlife website for more information, <http://fsweb.nris.fs.fed.us/training/studentResources.shtml>). The Region 9 Data Steward for NRIS Wildlife is John Curnutt (Appendix 1c).

(Optional) Population Monitoring Data Sharing

Population data can be very useful to others who are studying bats, including the effects of WNS on bat populations. Two Forest Service scientists would appreciate data submissions.

Susan Loeb, Southern Research Station (864-656-4865, sloeb@fs.fed.us)

Mist-net and roost observation data (summer or winter, roosts of all kinds). Data submitted will be added to the Southeastern Bat Diversity Network/Northeast Bat Working Group database. Data should be submitted in MS Access form, but MS Excel can be used if all data are provided. The latest version of the database will be hosted on the Southeast Bat Diversity Network website, available at: <http://www.sbdn.org/>.

Sybill Amelon, Northern Research Station (573-875-5341 x231; samelon@fs.fed.us)

WNS Surveillance Data

A field form and datasheet have been created by the National WNS Surveillance Working Group (Appendix 3).

- Use the field form when conducting internal or external WNS disease surveillance activities.
- Provide copies of the data sheets to your state WNS contact in a timely manner (Appendix 1d). The state contacts will feed this information up to the national and regional WNS coordinators.
- Biological observations collected during visits to hibernacula will be entered into NRIS Wildlife.
- As more information is uncovered as to whether *G. destructans* is an invasive species, the Regional Office staff will work with NRM to improve the NRIS TESP-Invasives module so that it can accommodate WNS surveillance results.

Cave and Abandoned Mine Data

- Biological data associated with inventories of caves or mines will be entered into NRIS Wildlife.
- Efforts are underway to develop a national Abandoned Mine Land module in Infra, based on existing databases developed by Regions 1 and 4. Further information on the status of this module will be provided by Tim Buxton (Appendix 1c) when it becomes available.

Appendix 1a. National WNS Coordinators

National WNS Coordinator	Jeremy Coleman USFWS New York Field Office 3817 Luker Road Cortland, NY 13045 (607) 753-9334 (607) 753-9699 (fax) jeremy_coleman@fws.gov
Assistant National WNS Coordinator	Vacant
National WNS Communications Leader	Ann Froschauer Northeast Regional Office U.S. Fish and Wildlife Service 300 Westgate Center Drive Hadley, MA 01035-9587 (413) 658-4493 (413) 253-8308 (fax) ann_froschauer@fws.gov
Midwest WNS Coordinator (IA, IL, IN, MI, MN, MO, OH, WI)	Rich Geboy USFWS Bloomington Field Office 620 South Walker Street Bloomington, IN 47403-2121 (812) 334-4261 x210 (812) 334-4273 (fax) richard_geboy@fws.gov
Northeast WNS Coordinator (CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT, WV)	Alison Whitlock Northeast Regional Office U.S. Fish and Wildlife Service 300 Westgate Center Drive Hadley, MA 01035-9587 (413) 253-8200 (413) 253-8308 (fax) alison_whitlock@fws.gov

Appendix 1b. WNS Points of Contact – Forest Service (National)

	Primary Contact	Alternate Contact(s)
Region 1	Kristi Swisher (406-329-3558; kswisher@fs.fed.us)	Maureen Kirchhoff (406-329-3518; mkirchhoff@fs.fed.us)
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Appendix 2. Decontamination Procedures for National Forest System Lands

The following decontamination procedures were included in the Forest Service's national WNS strategy, outlined in the Chief's letter, dated 28 July 2010. The document sets forth Forest Service-specific direction regarding entrance to caves or mines, storage and disposal of decontamination products, and management of show caves/tourist mines). Prior to implementing a new project, or at the beginning of a new field season, this document and the decontamination protocols ("Caver's Protocol" and "Researcher's Protocol") on the USFWS's WNS website should be reviewed.

Forest Service employees and contractors can continue to enter caves and abandoned mines on National Forest System lands for the purpose of conducting sanctioned and necessary work only. Additionally, Forest Service personnel are expected to work with grottos, permittees, concessionaires, and the general public to identify when and where cave entry should be allowed by the public. When official entry is necessary or allowable, ensure decontamination protocols are understood and followed. Not using these decontamination procedures could result in transmission of the fungus *G. destructans* and WNS. Should cave or abandoned mine entry be necessary, this protocol outlines procedures designed to potentially reduce the spread of the fungus. All decontamination products listed in Section 4 have been found to be very effective at killing the fungus in a laboratory setting; however, research is still needed to test effectiveness of these products in the field. We are aware that implementing this protocol requires a significant change to the way most of us have historically conducted official underground surveys, inspection or other visitations. It is more expensive, time consuming, and could potentially decrease the life of equipment. It requires a shift in perspective that human activity is potentially lethal to bats, we must tread lightly and it is our responsibility to do everything in our power to avoid being vectors of WNS.

In addition to USFS employees and contractors, starting October 1, 2010 this decontamination protocol is applicable to public entry/exit to caves, including show caves. Public entry into abandoned mines is very strongly discouraged because of safety reasons, and application of the decontamination protocols by the public would apply only when this message is ignored.

You should not handle bats. However, if you should observe live or dead bats that potentially are exhibiting characteristic signs of WNS, report this immediately to the appropriate Forest Biologist and state wildlife professional (see Appendix 1 of this Region 9 Response Plan).

SECTION 1: Characteristic Signs of WNS

During summer months, bats are normally viewed near dusk and dawn, but during winter they may be observed out during the day during periods of warmer temperatures. This may not be unusual behavior for bats. Different bat species naturally go into varying degrees of torpor during hibernation, and therefore, can arouse and exit hibernacula more frequently especially under warm conditions.

However, bats **may** be considered WNS-affected when:

- They are observed flying on the landscape during very cold temperatures.
- They are observed clinging to surfaces outdoors in winter.
- White fungus is observed on their bodies, particularly the nose and forearms.
- They have a dehydrated appearance.
- They are alive, but found on the ground and appear unresponsive.
- Numerous individuals have been found sick or dead at a location where a large population exists.

SECTION 2: Status of WNS

Visit http://www.fws.gov/white_nose.html for the latest information and the current spread of WNS.

SECTION 3: General Guidelines to Prevent the Spread of WNS

A "cave" includes all caves and fissures whether they are known to be used by bats or not. A cave is defined under the Federal Cave Resource Protection Act as "any naturally occurring void, cavity, recess, or system interconnected passages beneath the surface of the earth or within a cliff or ledge that is large enough for a person to enter, whether the entrance is excavated or naturally formed."

"Abandoned mines" include inactive open adits, tunnels, and shafts, but do not include active mines where ongoing mining activities are being conducted. If entry into these caves and/or abandoned mines is necessary, take the following precautions to prevent the possible spread of the fungus *G. destructans*:

- Avoid entry into all caves and abandoned mines, and observe cave and abandoned mine closures and advisories. Some federal agencies, states, private individuals and organizations have instituted closures and issued advisories beyond normal permanent and seasonal closures. Others have instituted, or are considering instituting, closures of caves with bats and/or advisories to stay out of caves with bats. Please visit: <http://www.fws.gov/WhiteNoseSyndrome/cavers.html> for a list of current closures. If closure information from a state in which you plan to go caving is not listed, contact that state's wildlife agency to obtain the latest information on cave access.
- To avoid contaminating a cave or abandoned mine in a currently unaffected state, DO NOT use gear that was used in a WNS-affected state outside that affected state. Within WNS-affected states, if gear (i.e. harnesses, ropes, or webbing) used within the affected state cannot be thoroughly decontaminated, do not enter other caves or abandoned mines in that state where the use of this gear is required. If gear can be thoroughly decontaminated and you must enter a cave or abandoned mine within the affected state, decontaminate all clothing, footwear, and gear prior to departing for an underground entry if you did not decontaminate these items after the last underground entry. Consult state wildlife and caving authorities for possible additional guidelines and requirements.
- In unaffected states, DO NOT bring gear, clothing, etc. in to a cave or abandoned mine that has been used in a cave or mine of any kind outside of the unaffected state or other regionally accepted area of delineation (e.g. Pacific Northwest Region; also coordinate with your State Wildlife Departments to be consistent about areas of delineation).
- In all States, decontaminate previously used gear, clothing, etc. immediately (see Section 4), store gear away, and thoroughly wash and decontaminate any surfaces with which these items may have come into contact (e.g., car trunk, duffle bag, etc.).

SECTION 4: Recommended Decontamination Products

The following chemical products were tested in a laboratory setting and were found to be particularly effective against killing the more resistant, spore-form of *G. destructans*, as well as the hyphae:

1. Lysol® IC Quaternary Disinfectant Cleaner (with a minimum of 0.3% quaternary ammonium compound) - this is a concentrate which requires a 1:128 dilution (1 part concentrate to 128 parts water or 1 ounce of concentrate per gallon of water)
2. Lysol® All-purpose Professional Cleaner

3. Formula 409[®] Antibacterial All-Purpose Cleaner (with a minimum of 0.3% quaternary ammonium compound)
4. A 10% solution of household bleach - this must be made by measuring 1 part bleach to 9 parts water (an estimate of 1:9 is insufficient)
5. Lysol[®] Disinfecting Wipes
6. Boiling water

Quaternary ammonium products such as 409 and Lysol cleaner must be properly disposed into a municipal water system (poured down a drain or toilet) or similar system to receive required treatment. It is illegal to dump these products on the ground. Follow the label instructions and do not wipe these products directly on your skin or surfaces that come in contact with humans, pets, bats, or other wildlife.

If using bleach solution, do not store dilution for more than 24 hours as the bleach will begin to break down once it is diluted. Store in opaque bottles as bleach also breaks down when exposed to sunlight.

Product guidelines should be consulted for compatibility before using any decontamination product listed under Section 3 on specific equipment. Also, detergents and quaternary ammonium compounds (i.e. Lysol[®] IC Quaternary Disinfectant Cleaner) should not be mixed directly with bleach as this will inactivate the bleach and in some cases produce a toxic chlorine gas.

SECTION 5: Containment and Decontamination Procedures

There is increasing evidence that *G. destructans* can be transmitted by human activities and that a cave/abandoned mine environment containing this fungus is infectious to hibernating bats. Follow these procedures for containment and decontamination to reduce the transfer of *G. destructans*.

Abandoned Mines

For the purposes of this discussion a “site” may consist of one or more related underground mine openings and may be as large as several square miles. Under situations where surveys are being conducted in association with abandoned mine closures for human safety, and multiple sites are being visited in a single day in states currently undocumented as affected by WNS, containment and decontamination between each site may be impractical. Specifically for abandoned mine entry associated with human-safety closures we recommend the following:

- Avoid entry if possible
- Limit entry to that necessary to safely perform survey or construction work. For construction this is typically less than 50 feet inside the adit or shaft.
- Follow the decontamination and containment protocol between sites if feasible. If decontamination is not feasible between sites, identify feasible opportunities for decontamination at the smallest possible geographic unit to minimize risk of contamination between locations. These geographic units could be hydrologic unit code boundaries (HUCs) or bat habitat use areas.
- Decontamination must occur no less frequently than at the end of each day.
- Protect the interior of vehicles with tarps, sheets, etc. if driving between sites without decontaminating clothing (including outer clothing), boots, socks, harness/ropes, helmet, hardhat, fannypack/daypack, headlamp, flashlight, camera or other gear.

Caves

Avoid cave entry if possible. Clothing (including outer clothing), boots, socks, harness/ropes, helmet, hardhat, fannypack/daypack, headlamp, flashlight, camera, and other gear should not be used in multiple entries in the same day unless the cleaning and decontamination recommended below can be performed between each entry. In situations where caves are known to be interconnected and have multiple entrances, decontamination is not required between entries at the various entrances, within the same day. In some situations in the west where caves are concentrated in a small area, Regions or Forests may identify logical decontamination areas that allow decontamination between cave clusters that are likely to be used by the same group of bats.

Decontamination Procedures for Abandoned Mines and Caves

We encourage Regions, Forests and Districts to develop decontamination plans for cave and abandoned mine entry on their administrative unit.

- Entry will only occur with clothing (including outer clothing), boots, socks, harness/ropes, helmet, hardhat, fannypack/daypack, headlamp, flashlight, camera and other gear that have been fully cleaned following the protocol below and rinsed prior to entry to remove residue of chemical product used.
- Minimize gear taken in to a site (e.g. take a small fanny pack instead of a large day pack, take 1 camera per group instead everyone taking a camera).
- Tyvek® or other disposable outerwear, rubber boot covers, and latex rubber gloves may be used for each entry in lieu of decontamination procedures for clothing. Upon exit, place these items in sealable containers, to be appropriately decontaminated and disposed of off-site.

Upon exiting a cave or abandoned mine and while still close to the opening, scrub off any dirt and mud from your clothing (including outer clothing), boots, socks, harness/ropes, helmet, hardhat, fannypack/daypack, headlamp, flashlight, camera and other gear and place them in a sealed plastic bag or plastic container with lid to be cleaned and decontaminated off site. This is especially important as organic material (i.e. clay soils) can prevent the chemical products from penetrating equipment, clothing, and boots, etc.

Outer clothing should be removed prior to entering a vehicle and after/between a cave/abandoned mine visit. A clean change of clothing is required after a cave or mine visit. Companion animals should be kept out of caves and mines as fungal spores could adhere to fur and be transferred to another cave.

Showering or bathing is required following cave or mine visits, including when conducting multiple-day excursions to multiple sites.

Submersible Gear (i.e. clothing and equipment that can be submerged without damage):

- Wash all clothing and any appropriate equipment in washing machine or by hand using conventional detergents. Washing can be done in cold, warm or hot water. Laboratory testing has found Woolite® fabric wash to be the best detergent for this procedure. Rinse thoroughly, and then follow by soaking for a minimum of 10 minutes in one of the recommended decontaminating products listed under Section 4, then rinse and air dry. Boiling items for 15 minutes can be done in lieu of chemical treatment.

Footwear:

- Where possible, rubber (wellington-type) caving boots (which withstand harsh decontaminating products and are easily cleaned) are recommended. Boots need to be fully scrubbed and rinsed so that all soil and organic material are removed. The entire rubber and leather boots, including soles and leather uppers, can then be decontaminated with an appropriate chemical product listed under Section 4 for a minimum of 10 minutes, then rinse and air dry. Boiling items for 15 minutes can be done in lieu of chemical treatment.

Disposable clothing and footwear:

- Use of Tyvek® or other disposable outerwear, rubber boot covers, and latex rubber gloves may be used for each entry. Upon exit, place these items in sealable containers, to be appropriately decontaminated or disposed of off-site.

Ropes and Harnesses:

- It is the responsibility of each individual using life-support equipment – such as harnesses and ropes – to ensure that the decontamination protocols in use are chemically compatible with this equipment. To date, only Sterling rope and webbing have been shown not to be damaged by the following decontamination protocol: Wash rope/webbing in a front loading washing machine on the gentle cycle using Woolite® Extra Delicates detergent. Treat by immersion in a 1:128 dilution of Lysol IC Quaternary Disinfectant Cleaner for 15 minutes. Rinse in fresh, clean water for a minimum of two rinses and allow to air dry.

If you are using other brands of rope and webbing not mentioned above, these products have yet to be tested for integrity after decontamination. In cases where safety following decontamination has not yet been evaluated, then ropes and webbing should be dedicated to one cave or not used at all to prevent the spread of WNS.

Non-submersible Gear (i.e. equipment that will be damaged by submersion):

- Clean thoroughly with soap and water (or use Lysol® Disinfecting Wipes), then decontaminate by applying one of the recommended chemical products listed under Section 4 to the outside surface for a minimum of 10 minutes, then rinse and air dry. This may include flashlights, headlamps (elastic straps can be removed and washed as a submersible item), and headgear.

Air Monitors:

- Air monitors are required safety equipment for underground abandoned mine entry. The manufacturer of your air monitor (ESPECIALLY THE SENSORS) must be consulted with prior to applying any decontaminant chemicals, to ensure that the sensors and electronic components are not compromised in any way. Follow the manufacturer's recommended procedures.

Cameras and Electronic Equipment:

- If possible, do not bring electronic equipment underground. If practical, cameras and other similar equipment that must be used may be placed in plastic casing (i.e. underwater camera housing) or wrapped in plastic wrap where only the lens is left unwrapped to allow for photos to be taken. The plastic wrap can then be decontaminated by using Lysol® Disinfecting Wipes and discarded after use. If using plastic wrap is not practical, Lysol® Disinfecting Wipes can be applied directly on camera surfaces or plastic casing.

Vehicles:

- In addition to caving or abandoned mine gear, vehicles used to transport equipment may harbor spores. Always remove and contain clothing and gear away from your vehicle in sealed plastic bags and storage containers with lids and wipe them with wipes prior to placing them in your vehicle. Be sure to dispose or decontaminate bags and storage containers along with your gear using one of the chemical products listed under Section 3.

Show Caves and Tourist Mines

Work with contractors, special use permittees, and concessionaires to enlist a decontamination process for all individuals entering show caves or tourist mines by implementing a combination of the following actions that best fits the situation and will be most effective:

- Provide education to visitors on caves, bats, and WNS such as is being conducted at Mammoth Cave (<http://www.nps.gov/macawhitenose.htm>)
- Close these sites to entry for anything other than WNS surveillance during hibernation season (roughly from October 1 – May 1).
- In WNS unaffected States prohibit entry with footwear that has previously been in a cave or mine outside the State or other regionally accepted area of delineation (e.g. Pacific Northwest Region); Also coordinate with your State Wildlife Departments to be consistent about areas of delineation). In WNS affected States, forbid entry with footwear that has previously been in a cave or mine of any kind outside the county, **OR** require footwear decontamination prior to entry at a provided/supervised decontamination station, **OR** sell disposable rubber booties to be worn in place of footwear.
- In WNS unaffected States, prohibit entry with clothing that has previously been in a cave or mine outside the State or other regionally accepted area of delineation (e.g. Pacific Northwest Region); Also coordinate with your State Wildlife Departments to be consistent about areas of delineation). In WNS affected States, forbid entry with clothing that has previously been in a cave or mine of any kind outside the county **OR** provide disposable Tyvek suits for sale.
- Forbid carrying accessory items such as water bottles, cameras, cell phones, daypacks in to caves or tourist mines that have previously been in a cave, abandoned mine or tourist mine, unless decontaminated on site.
- Provide a decontamination station and personnel to run it.
- Restrict human entry in to portions of caves or tourist mines used by bats any time of year.
- Restrict human traffic to well-defined contained pathways that avoid opportunities for human contact with cave features other than the pathway.

Appendix 3. WNS Disease Surveillance Data Sheets

Winter Bat Hibernacula/Landscape White Nose Syndrome Surveillance Data Form

SITE NAME or No.: _____ **SURVEYOR:** _____
 (Lead Surveyor who is responsible for reporting)
LAT: _____ ° - _____ ' _____ " (N) **LON:** _____ ° - _____ ' _____ " (W) **DATUM (check):** WGS84 NAD83 NAD27
Lat/Lon Precision (check): GPS From Map County Resolution Not Mapped Other (specify) _____
 (check- "GPS" if GPS unit used; "From Map" if plotted from map; "County Resolution" if coordinates are only County specific)
COUNTY: _____ **STATE** _____ **TYPE of SURVEY/MONITORING (check all that apply)**
 Internal Survey External/Entrance Survey
 Hibernacula Maternity Roost General Landscape
 Video Monitoring Beam Break Acoustic Monitoring
DATE: _____

WNS ASSESSMENT

White-Nose Syndrome Signs	Present (1) Unknown/Absent (0)
Increased mortality in colony in/near hibernaculum, maternity roost site, or clustered on the landscape	
Observed outside in cold temperatures or consistently during daylight hours	
Roosting near hibernaculum entrance in winter	
Fungus observed on body	
Originate from/detected in hibernaculum previously labeled as a positive WNS affected site	
Muzzle, ear, and/or wing membrane lesions (active or chronic)	
Dehydrated appearance	
Thin, low body weight/arm length index	
Difficult to rouse with disturbance	
Found sick or dead at location where historic population size is diminished	
Alive, but found on ground	
TOTAL	

ENTRANCE SURVEY

Weather:

Temp		Conditions (rain, windy, etc.)	
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OBSERVATIONS AT ENTRANCE (take 15 minutes for entrance observation)

Flying bats # observed/1 minute:		Moribund bats # observed:	
Dead bats # observed:		Bats clustering # of clusters observed:	
Photo documentation Photo #(s)			

Specimen/sample sent to lab? YES NO What lab were samples sent to?

Type and Quantity of Specimen or Sample Type: Whole Carcass _____ Biopsy _____ Fungus _____ Soil _____

COMMENTS (Description of effort, summary of methods etc.):

Winter Bat Hibernacula White Nose Syndrome Internal Survey Data Form

SITE NAME or No.: _____ **SURVEYOR:** _____
(Lead Surveyor who is responsible for reporting)
LAT: ____° - ____' ____" (N) **LON:** ____° - ____' ____" (W) **DATUM (check):** WGS84 NAD83 NAD27
Lat/Lon Precision (check): GPS From Map County Resolution Not Mapped Other (specify) _____
(circle- "GPS" if GPS unit used; "From Map" if plotted from map; "County Resolution" if coordinates are only County specific)
COUNTY: _____ **STATE** _____ **TYPE of SURVEY/MONITORING (check)**
 Internal Survey External/Entrance Survey
 Hibernacula Maternity Roost General Landscape
 Video Monitoring Beam Break Acoustic Monitoring

NUMBERS OF BATS OBSERVED INFECTED (Visible White Fungus) or DECEASED by SPECIES

Species	Total # per spp	# Infect	% Inf	# Dead	Species	Total # per spp	# Infect	% Inf	# Dead	Species	Total # per spp	# Infect	% Inf	# Dead
CORA					COTO					EPFU				
LANO					MYAU					MYGR				
MYLE					MYLU					MYSE				
MYSO					PESU					UNK				

Photo documentation: _____

Specimen/sample Sent to Lab? YES NO **What lab were samples sent to?**
Type and Quantity of Specimen or Sample Type: Whole Carcass ____ Biopsy ____ Fungus ____ Soil ____

Specimen / Sample(s) taken by Species:

CORA		COTO		EPFU		LANO	
MYAU		MYGR		MYLE		MYLU	
MYSE		MYSO		PESU		Other	

COMMENTS (Description of effort, summary of methods etc...):

PLEASE ATTACH A CAVE/SITE MAP WITH LOCATIONS OF BATS MARKED